DOCUMENT RESUME

ED 093 979 TM 003 835

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TITLE Toward A Comprehensive Validated System of Classification of Knowledge, Process, And Value Student Learnings.
PUB DATE Apr 74
NOTE 15p.; Paper presented at the Annual Meeting of the American Educational Research Association (59th, Chicago, Illinois, April 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Academic Achievement; *Classification; Educational Needs; *Educational Objectives; Goal Orientation; *Knowledge Level; *Learning Processes; Student Needs; Validity; *Values

ABSTRACT

The increasing trend toward the formulation of student learnings in goal-based rather than textbook-based organizations, and the steadily growing concern for openness and flexibility in education have created a pressing need for a comprehensive, validated system for classification of knowledge, process, and value student learnings. Such a system serves as a means of communication and as a framework for educational research and development. The insights and end products of a two-year program of cooperative research which has involved public school teachers, evaluators, curriculum specialists, and university researchers in an effort to design and test such a system are described. (Author)

ED 093979

TM 003 835

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TOWARD A COMPREHENSIVE, VALIDATED SYSTEM OF CLASSIFICATION OF KNOWLEDGE, PROCESS, AND VALUE STUDENT LEARNINGS

by

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American Educational Research Association Conference
Chicago, Illinois

April 1974

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The Portland, Oregon, goal development project involves 55 school districts in a three county area. Its principal product is a set of goals (learning outcome statements) for grades K-12. Currently, goals are available in separate volumes for twelve major areas of instruction (e.g., math, language arts, music). To facilitate interdisciplinary planning and other specialized educational concerns, the full set of over 20,000 goals will soon be stored in a computer, with multiple bases for retrieval of specific goals.

Classification systems devised for organizing and retrieving goals are of two basic types: (1) content taxonomies specific to each collection; (2) coding systems applied uniformly to goals in all collections. This report focuses on three classification systems of the second type; in particular, on efforts made to construct valid systems for coding and retrieving goals according to the types of knowledge, processes, and values they represent or develop.

I. Knowledge Classifications

In developing knowledge classifications (Exhibit A), the work of Gagné, Bloom, Walbesser, and others provided useful starting categories. This was especially true of Bloom's Handbook I.

The present categorization was developed in response to logical insights and empirical evidence accumulated over two years of writing, coding, using, and revising goals in all subject areas.

Departures from Bloom may be noticed, both in organization and in naming of categories. For example, the knowledge categories do not deal with knowledge of generalizations as a basic category, but rather assume that any goal representing a generalization must also deal with one or more of the basic categorizations. Generalizations as a class of knowledge are therefore given superordinate status and divided into two classes: principles and laws, and simple generalizations. Also, notice there is no category of

knowledge of specific facts as found in Bloom, for we have been able to subsume all such goals under the basic ten categories. New categories not found in Bloom include knowledge of properties, parts, characteristics, features, elements, dimensions; knowledge of contexts, locations, orientations; knowledge of operations, methods, functions; knowledge of causes and effects including costs and benefits, advantages and disadvantages; and knowledge of relationships that are not cause-effect.

II. Process Classifications

In developing and classifying a list of processes, it was first necessary to identify those processes which are teachable. As commonly used by psychologists and educators, the term "process" may refer to: (1) mental operations or psychological processes, usually considered to develop hierarchically through the interaction of hereditary and environmental factors; or (2) conventional, standardized, and formalized processes: procedures, techniques, methods devised by humans as efficient applications of mental processes; skills humans learn from each other.

Educators obviously cannot teach psychological processes; educators can influence their development in an individual by passing on cultural and disciplinary skills and providing opportunities for the individual to apply them meaningfully.

It became apparent to teachers, consultants, evaluation specialists, and administrators involved in the project that the process categories drawn by Bloom, Gagné, and most other authorities were more descriptive of psychological than of teachable processes. A scheme was sought which would more appropriately organize processes of the second type.

Major classes of teachable processes were tentatively identified as inquiry/problem solving, human relations, and production. The most challenging major class of process was inquiry/problem solving. It was decided to characterize this field as that set of processes that involve the acquisition, verification, interpretation, use, and communication of information. This classification system with its major headings and subheadings is shown in Exhibit B.

Many adjustments were made in the classification system as goals were written and coded. The probability that important elements were omitted is very small indeed. The classification categories, which are purposely pragmatic and educator-oriented, still lack the support of precise definitions.

Most terms and phrases used to describe these classification elements have a fairly self-evident meaning to teachers: evaluating authoritativeness of sources, ordering and sequencing, comparing and contrasting, associating, relating, equating, generalizing, theorizing and predicting, testing hypotheses, making decisions, etc. It is assumed that for every category in the system there exists at least some standardized or formalized processes which can be taught, learned and replicated.

Although the process classifications are general, goals which relate to them may be quite particular and quite different within a category. For example, the general meaning of the term "to analyze" is to examine the component parts of an entity in an effort to understand the whole. Standard processes of analysis occur in the analysis of literature according to conventional criteria, or in the analysis of chemical composition, the parts of speech in a sentence, or the logic of an argument. Any of these types of analysis might be represented as goal statements within the different fields of study in which they are normally taught. Each formal process of analysis taught in these respective settings would be expected to contribute to the overall ability of a student to employ general analytic processes. In other words, there is no single process of analysis that can be taught, but rather many techniques found useful in a variety of problem situations. In the collection of course goals created by the Portland project, all goals that appear to contribute to the process of analysis are coded and could be retrieved by that code irrespective of the subject under which they are classified. The same is true of all other process categories.

Because of the importance of inquiry and problem solving processes both in science and in the social sciences, it was found useful to develop for these collections entire sections dealing exclusively with process. In all types of science it was found appropriate to classify such goals under two major taxonomic headings: "universal processes of inquiry and problem solving" and "conventional processes used in the discipline." In the goals for biological and physical science, subheadings for processes used in the discipline include measurement, using equipment, using scientific vocabulary, using models, and using mathematics.

III. Value Classifications

Another major effort in classification was associated with the attempt to assign concept and value words to goals in the collections. Teachers who produced goals were asked to indicate if a goal being stated seemed to contribute in any way to the development of a concept or a value. Several thousand goals were produced under this procedure, and teachers attempted to designate the values and concepts they believed each goal to be associated with. The result of all this, as one might imagine, was a very diverse set of concept and value words, even though some words deemed as "good examples" of concepts and values were provided the goal writers by the project leaders. This achieved little uniformity in the types of words used to designate values and concepts. What did result, however, was a very rich collection of words which could be grouped for purposes of analysis and classification.

Efforts to classify concept words were complicated by many of the same definitional problems encountered in classifying processes. The list of concept words is still being refined, and categories have not yet been established.

Value word classification proved somewhat more fruitful. It was possible to identify groupings which are sufficiently homogeneous to warrant separate categories. While granting that such an empirically derived classification system may have its logical deficiencies, groupings of words with apparently distinctive characteristics were achieved, and the terms used to describe them communicate those distinctions rather well.

Values education is currently focused on two main concerns: (1) teaching students ways of clarifying their own values, understanding the values of others, and resolving value conflicts; (2) clarifying the values to which schools are committed; the values which educators reinforce or teach deliberately and accidentally through their interactions with students, and through their curricular, methodological, and organizational decisions.

Goals which relate to the first concern are included in all revised collections, grouped taxonomically under the heading "Value Clarification." They include knowledge and process goals, and are coded accordingly. They represent the kinds of information and skills with which individuals may evaluate, restructure, expand, and appropriately apply their own value systems. They do not deal with specific values to be taught or reinforced by educators, or acquired and applied by students.

Exhibit C contains descriptors of specific values and is addressed primarily to the second main concern of values education. It provides a useful frame of reference for educators attempting to identify legitimate affective goals, and to structure their instruction so that individuals are supported in the development of personal values that meet their own needs and the needs of society.

As goal collections are revised, the value classifications are being used in two ways:

(1) To guide the writing of affective goals appropriate to each discipline, grouped taxonomically under headings such as "valuing conditions which promote scientific inquiry."

(2) To code with appropriate value words the knowledge, process, or valuing goals in all collections which may be useful in dealing instructionally with particular values.

The use of the three major categories, "Environment: Related Values," "Society and Culture: Related Values," and "Personal Functioning: Related Values" should be explained. All values are personal; hence the category "Personal Functioning: Related Values" refers to values which are characteristic of an effectively functioning person. The category "Society and Culture: Related Values" concerns the personal valuing of ideals, institutions, laws, processes, language, and other societal and cultural inventions. The category "Environment: Related Values" concerns the personal valuing of the environment and means of understanding it, coping with it, and communicating about it. Certainly these classifications are arbitrary, but most of the homogeneous groupings of value words produced by teachers in the project seem to fit reasonably well within them and their several subcategories.

In attempting to validate this classification scheme, project participants accepted the general propositions that values develop in answer to basic human needs, and that circumstances and individual differences lead to the development of widely differing values to satisfy essentially similar needs. In the last analysis, valid values and value systems are those which, appropriately applied, satisfy basic human needs.

The validation process was necessarily subjective and exploratory; terms and headings used in the classification system were reviewed in relation to the hierarchical levels of basic human needs defined by Dr. Abraham

Maslow (i.e., physiological, safety and security, love and belonging, status, self-esteem, and self-actualization needs).

All of the values identified within the classification system can be logically related to the satisfaction of one or more basic needs. Some of the category headings relate obviously to one particular level of need, e.g., "Qualities that enhance personal and social relationships" (3.2) and the love and belonging needs; "Social regulators" (2.5) and the security needs. Most categories, however, relate to various need levels, e.g., "Using environmental resources" (1.4) and the physiological, security, status, self-esteem, and self-actualization needs.

All three classification systems described in this report are subject to revision, and we welcome any criticisms and suggestions that would assist us in making further refinements.

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Exhibit A

-Knowledge Categories-

G1	Principles and Laws
G2	Simple Generalizations
K1	Conventions: Names and Nomenclature
K2	Conventions: Symbols, Rules, Standardized Processes, Definitions
K3	Properties, Parts, Characteristics, Features, Elements, Dimensions
K4	Trends and Sequences
K5	Similarities and Differences, Discriminations, Classifications
K6	Contexts, Locations, and Orientations
K7	Operations, Methods of Dealing with, Functions
K8	Cause and Effect Relationships (Costs and Benefits)
K9	Criteria or Standards
K10	Non Cause-Effect Relationships

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Exhibit B

-Inquiry-Problems Solving Processes-

P1 Input — Acquiring Information

- P11 Viewing
- P12 Hearing
- P13 Feeling (tactile)
- P14 Smelling
- P15 Tasting
- P16 Using sense extenders
- P17 Using internal sensors of emotion

P2 Input Verification — Insuring Validity and Adequacy

- P21 Evaluating authoritativeness of sources
- P22 Evaluating logical consistency and accuracy
- P23 Evaluating relevance to desired learning purposes
- P24 Evaluating adequacy for acting or deciding (comprehensiveness and depth)

P3 Preprocessing — Organizing Information

- P31 Labeling, naming, numbering, coding
- P32 Recording, listing
- P33 Classifying, categorizing, grouping, selecting according to criteria
- P34 Ordering, sequencing
- P35 Manipulating, arranging, transforming, computing
- P36 Estimating
- P37 Summarizing, abstracting

P4 Processing I — Interpreting Information (drawing meaning from data)

- P41 Decoding verbal and nonverbal symbols (reading and literal translating)
- P42 Inferring, interpolating, extrapolating
- P43 Analyzing
- P44 Associating, relating, equating
- P45 Comparing, contrasting, discriminating
- P46 Synthesizing
- P47 Testing against standards or criteria
- P48 Generalizing

P5 Processing II — Using Information to Produce New Information

- P51 Theorizing, predicting
- P52 Formulating hypotheses
- P53 Testing hypotheses
- P54 Revising hypotheses

P6 Output I — Acting on the Basis of Information

- P61 Reacting
- P62 Making decisions
- P63 Solving problems
- P64 Restructuring values (adapting, modifying)
- P65 Restructuring behavior (adapting, modifying)
- P66 Encoding verbal and nonverbal symbols prior to communication
- P67 Creating on the basis of knowledge and process

P7 Output II — Communicating Information

- P71 Vocalizing (nonverbal)
- P72 Gesturing, moving
- F73 Touching
- P74 Speaking
- P75 Writing
- P76 Using art media (painting, drawing, sculpting, constructing, etc.)
- P77 Dramatizing
- P78 Singing, playing instruments
- P79 Dancing

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Exhibit C

Values Classif.cations

1. Environment: Related Values
   - 1.1 Qualities of environment
     - Complexity
     - Diversity
     - Order (regularity)
     - Unity
   - 1.2 Coping with environment: activities
     - Exploring
     - Inquiring
     - Modifying
     - Adapting
     - Predicting
     - Planning
   - 1.3 Coping with environment: modes
     - Fantasy
     - Logic
     - Research
     - Experimentation
     - Prayer
     - Mysticism
     - Invention
   - 1.4 Using environmental resources
     - Knowledge of resources
     - Access to resources
     - Maintenance of resources
     - Preservation of resources
   - 1.5 Representing the environment
     - 1.5.1 Forms of representation
       - Images
       - Symbols
       - Models

1.5.2 Qualities of objective representations

Clarity

Accuracy

Logical consistency

Relevance

Comprehensiveness

Predictive validity

Adequacy as basis for action or decision

1.5.3 Qualities of artistic representations

Techniques

Form

Harmony

Dissonance

Symmetry

Rhythm

Grace

Style

Eloquence

Integrity

Individuality

2. Society and Culture: Related Values

2.1 Social ideals

Justice

Democratic process

Rule of law

Equality

Freedom

Brotherhood

Social morality

Social responsibility

Peace

Productivity

Security, collective

Unity of purpose

Pluralism

Stability

Progress

Honor

Literacy

2.2 Social processes

Working

Communicating

Assembling

Participating

Sharing

Cooperating

Competing

Educating

Problem solving

Planning

Policy making

2.3 Social rights

Freedom of speech

Freedom of assembly

Freedom of inquiry

Voting

Dissenting

Assenting

Privacy

Ownership of property

Equal protection under law

2.4 Social institutions

Family

Schools

Government

Religious institutions

2.5 Social regulators

Mores

Laws

Policies

Regulations (rules)

2.6 Cultural heritage (social conventions)

Language

Tools

Cultural arts

Cultural beliefs

Cultural knowledge

Cultural skills

3. Personal Functioning: Related Values

3.1 Qualities that contribute to personal effectiveness

Curiosity

Rationality

Resourcefulness

Perseverence

Innovativeness

Initiative

Ingenuity

Imaginativeness

Creativity

Commitment

Adaptability - flexibility

Judgment

Insight

Knowledgeability

Responsibleness

Efficiency

Craftsmanship

Self-discipline

Openness

Aesthetic responsiveness

3.2 Qualities that enhance personal and social relationships

Tolerance

Appreciativeness

Trust

Thoughtfulness

Sensitivity

Respectfulness

Compassion

Love

Individuality

Humility

Dignity

Faithfulness

Empathy

Courage

Integrity

Humor

Morality

Cooperativeness

Social concern

Social sensitivity

Friendliness

Honesty

3.3 Conditions of self-esteem and self-actualization

Personal growth and development

Competence

Self-knowledge

Self-confidence

Self-respect

Self-reliance

Self-direction

Self-expression

Self-fulfillment

3.4 Self-actualizing responses to environment

Curiosity

Concern

Respect for life

Wonder

Reverence

Awe

Satisfaction

Enjoyment

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